# White Paper Report

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# White Paper

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**Project Title:** Interdisciplinary Planning for Energy-Efficient Cold Storage at the Minnesota History Center

**Project Director:** Shengyin Xu

**Institution:** Minnesota Historical Society

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# Introduction

Current industry standards indicate that some audio-visual film materials should be stored in a range of 36°F to 70°F and 20-50% relative humidity (International Standards Organization); however, these ranges are often unattainable and not sustainable in the long-term for organizations. Further, these ranges do not take into consideration the climate of the storage area (e.g. outdoor conditions) or the costs to maintain these conditions in the long-term.

This white paper summarizes a study conducted by the Minnesota Historical Society (MNHS), and funded by a NEH Sustaining Cultural Heritage Planning Grant, that wished to understand and balance the issues of long-term preservation for film materials. These issues include preservation metrics, potential energy use, cost for maintenance, as well as investment cost for any recommended system or building upgrades. To examine these factors and help MNHS develop a strategy for energy-efficient, long-term film storage, an interdisciplinary team was brought together in a series of collaborative workshops. The team included staff from collections, conservation, facilities, risk management, and sustainability, and brought in experts in museum sustainability, archival architecture, film preservation, and building mechanical systems. To facilitate and manage the broad collaboration of participants, specific tools and processes were utilized throughout the study.

Through this collaboration, many different passive and active strategies initially brought forth were reduced to a cohesive set of recommendations that included building improvements and specific upgrades of equipment. In all, the bundle of strategies will help MNHS increase the film collections Preservation Index (PI), Image Permanence Institute's measure of the "decay rate of vulnerable organic materials" in different temperature and relative humidity condition;, while also decreasing energy use and operating costs. Specifically, MNHS hopes to increase the PI by 2-4 times from 100 years to a range of 200 - 400 years allowing for seasonal fluctuation. Further, a subset of critical film material will increase its PI from 100 years to 900 years. In addition to improving the long-range preservation for film collections, there is also an anticipated savings of $16,600 in energy costs per year as compared to baseline adaptations of the existing system.

While the study focused on the Minnesota Historical Society's collections storage, these findings have significance for many organizations. The range of strategies examined included low capital investment cost options, such as reconfiguration of the collections by material type and the impact of passive mechanical interventions. The cost-benefit analysis of these options will provide a start for organizations to find their own path in developing energy-efficient collections storage. Further, the interdisciplinary processes utilized by the study were essential in arriving at the final recommended bundle of strategies. As such, this proposal hopes participants will understand the issues that must be considered in designing cold storage for collections, as well as the collaborative processes that help balance these issues towards achieving the best possible storage environment within existing facilities and budget constraints.

# Project Goals and Results

The project goal was to investigate the options for both increasing long-term preservation performance and reducing energy consumption for a series of film storage rooms. Given the potential complexity and multiple perspectives on any possible interventions to either improve preservation performance or to improve energy efficiency, the project also decided to utilize an interdisciplinary team consisting of a variety of fields and backgrounds to achieve these two seemingly opposing goals.

***Quantitative results***

To achieve the objective of increasing long-term preservation and energy performance, quantitative measures that represent these issues were selected and agreed upon as a large team. For preservation, the expert panelist from Image Permanance Institute suggested Preservation Index (PI). IPI's researchers developed a metric that quantifies the influence of temperature and relative humidity on the rate of chemical deterioration of materials, called the Preservation Index (PI). The Time-Weighted Preservation Index (TWPI) is a version of the PI metric that incorporates time in order to rate the aggressiveness of the indoor climate, which is essentially a projected lifetime of the material being preserved at the particular set-point of temperature and relative humidity.[1] For the planning grant purposes, using PI instead of TWPI would capture our need without having to set a time. However, when the project is implemented, using TWPI will be preferred over PI.

From a PI perspective, the project has significantly increased the long-term preservation performance of the collections within the current "cold storage" rooms. If the ideal final state of two zones – a freezer zone and a cool zone – the improvements on the items in each of the zones would include the following:

- Achieve a 900% increase in preservation index for freezer storage collections (30 degrees F / 30% RH).
- Achieve a 200-400% increase in preservation index for general cold storage collections (50 degrees F / 50% RH).

As compared to the existing conditions of 60 degrees F and 35% RH, which result in a PI of about 100 years, this project, even just Phase 1 of a 2-4 times increase in PI, would still represent significant improvements for long-term preservation.

From an energy perspective, the team decided to rely on industry best practices for metrics, including kBTU to represent energy measures, and estimated costs based on local energy prices without maintenance cost savings included. These metrics allow the engineers to produce simple payback or return on investment figures, which were the primary means for discussing energy options. However, to do return on investment or payback figures, there needs to be a baseline to compare outcomes. In discussing these metrics with the team of Society staff, engineers, and our expert panelists, it was determined that the baseline for energy should not also include factors of long-term preservation issues. As such, comparing a baseline energy use of a system that produces a 100 year PI, while the team is aiming for a 200-400 year PI would double-count the impact of the

[1] Seminar Reference Workbook for Sustainable Preservation Practices for Managing Storage Environments. Image Permanence Institute, Rochesterm NY (version 1.2, 2010).

preservation environment. To put it in another way, the sensitivity of the energy figures would be based upon the PI figures if the temperature and relative humidity operations were different from baseline to the measured option. On the recommendation of the engineers, the team decided to use a baseline for energy that took the existing system operated at 50 degrees F / 50% RH, even though the system does not currently operate as such given capacity constraints.

Given this understanding of the energy metrics, the final recommendations that include both phases and zones – the cool zone and freezer zone, will produce the following energy savings:

- Approximately $16,600 in energy cost reductions, or 41% reduction based off of estimated $40,000 baseline annual cost.

As such, both quantitative energy metrics and preservation metrics outcomes indicate significant improvements should the project be implemented. For the planning study, these projected figures represent significant accomplishments and a framework for communications and fundraising that should be impressive to people from many fields and backgrounds.

### ***Qualitative accomplishments re: objectives***

The planning project was very focused on technical systems and quantitative metrics, however, the interdisciplinary team aspect of the objectives cannot always be measured with solid numbers. The team did achieve an accomplishment in bringing together facilities and collections departments to work collaboratively and assume equal ownership over the project. As such, the following feedback can serve as a means for understanding the qualitative accomplishment towards the goal of interdisciplinary processes and team work.

Excerpt, letter from Michele Pacifico for NEH application (Oct 21, 2014):

> *"This is a ground breaking study and serves as a model for many other archives and special collections who are searching for ways to improve conditions in their existing structures while reducing their energy use and costs and improving sustainability. The study provides a excellent review of some of the issues that must be considered by institutions striving to maintain their preservation goals while managing energy consumption and developing a sustainable building program. Implementing the improvements deemed most critical to MHS's preservation goals will provide valuable information for many other institutions and much needed improvements to conditions at MHS."*

Excerpt, letter from Sarah Sutton (Brophy) for NEH application (Nov 22, 2014):

> *"This project is an important part of ever-improving collections care, and in continuing MNHS leadership work in strategically reducing energy consumption at the Minnesota History Center."*

Emails from MNHS staff in facilities and team members Karen Nichols and Dave Dahlin (Apr 1, 2014):

> *"Shengyin has also done a nice job of getting this project off the ground. I think some real good ideas were shared on how to get control of the cold storage areas.*
>
> *Thank you,*

*David"*

******

*"GREAT meeting yesterday and the building is so very lucky to have the three of you working working here!! --Karen"*

Comments from MNHS staff and team member in Conservation Bob Herskovitz (Dec 22, 2014):

*"The consultants were knowledgable and worked well with staff. Representatives from nearly every department and section contributed as did the contract building engineers. From my perspective as a long-time staff member, the project ran smoothly with everyone contributing in the give and take and reached a good consensus. With this planing completed, the institution is now positioned for implementation."*

These statements reflect that the external and internal perspectives on the interdisciplinary approach are highly positive, despite the time and the need to adapt to new processes. Thinking beyond the project, it is likely this approach can be utilized by MNHS, and other organizations, to work on projects that require multiple layers of complexity or decision-making that impacts different areas of an institution.

***Not achieved, what else will be done and how it will be funded***

The final outcome of the project includes two clear directions for implementation – one phased approach for limited funding and one all-at-once approach should enough funding be raised. There are several other lines of investigation that need to be coordinated with the implementation approach – phased or all-at-once. As such, the planning grant did not leave any areas of investigation unaddressed; however, to get towards implementation, MNHS is considering the following next steps.

*More rigorous indoor air testing*

While there was additional testing completed by the engineers during the planning phase, questions were raised about the level of filtration and adequacy or redundancy. As such, during fundraising and implementation planning, additional indoor and outdoor air quality testing can be done to better understand the filtration needs for a new HVAC system for the cool and freezer zone rooms.

The goal of this indoor air quality testing will be to better understand the particulates that are coming in from outside (outdoor air intake) and what is being generated inside (if collections materials are off-gassing). The current indoor air quality of the rooms are measured using a coupon system. This second, more rigorous round of testing will be an active testing system rather than the passive coupon system. This new indoor air quality test was recently deployed in November 2014 and will generate results from the lab early in 2015.

*Impact on collections management system*

In addition to the direct work around developing a new HVAC system to accommodate the two zones, there is also the need to plan out the transition from the current organization of collections items across three rooms to collections organized by material within two temperature and RH zones. This will require further internal coordination and exploration of how that may impact public access to the collections. In particular, this will impact those more sensitive materials that go into freezer storage. These materials will require a transition period to go from 30 degrees F / 30% RH to room temperature.

The discussions on impact on collections access and management will continue until the design of the new HVAC system is finalized. Until there is funding for the construction, the team will continue to look at options and impacts for collections impacts as more details about the design and construction emerge.

*Production of design drawings towards construction*

Implementation will include design finalization, specifications, final construction documents, construction, and post-occupancy testing.

As part of the final construction documents and construction planning, the MNHS team will also need to develop a logistics plan to transition from the current configuration of collections to the new two zone configuration. This will run concurrently to the construction document development and ideally be considered part of the final design and construction costs. This timing will allow these components to be aligned and coordinated.

# Audience

While the project is focused on the cold storage rooms at the Minnesota History Center, there is a different audience for the collections within the rooms than the broader audience for the museum. A smaller subset of the main audience for the building uses the library, and of that subset, an even smaller are likely to access the cold storage rooms.

General patronage to the library and accessing of the cold storage is not likely to increase as a result of the project. The primary benefit of the project will be to increase the long-term preservation and energy costs for the collections, which will support the existing patrons, but not necessarily be something that increases patronage.

The project may indirectly increase visitors via the broader sustainability communication efforts. In the context of the sustainability efforts within the entire History Center building, there may be a technical focused tour of energy reduction efforts for the general public. In addition to the energy efficient cold storage project, the building has undergone a number of renovations and upgrades to the HVAC system and water system. As the list of possible energy reduction strategies are taken care of, the building will likely add energy generation such as solar panels or community solar to offset the energy use for the museum. While a tour of these features would not necessarily attract more of the same general audience of the History Center, but bring in a new, smaller subset of technically focused audiences.

# Evaluation

***Evaluation Goals and Methods***

The project had very rigorous quantitative evaluation built into the goals and objectives of the project. This included energy metrics for each option produced by the engineers and preservation index calculations done by the MNHS team. The four expert panelists reviewed and verified the metrics. The goal of the evaluation was to better understand the balancing of increasing long-term preservation horizons with the decrease of energy and maintenance costs.

### *Evaluation Outcomes*

As discussed in the Accomplishments section, the outcomes of the project include very specific quantitative metrics for long-term preservation outlook and for energy reduction. For the long-term preservation metric –Preservation Index (PI) – the team began with utilizing the online tool dpcalc.org. This tool outputs PI, and other metrics, when temperature and RH or dew point is entered. As a starting point, this tool helped the team come to a consensus on potential operating ranges. The existing conditions were at 60 degrees and 50% RH, which is a PI of 100 years. Further, ISO standards note a wide range of possible cold storage conditions from 36 – 70 degrees F and 20 – 50% RH. Given this information, the team worked with the expert panelists to arrive at two different tracks of HVAC options – 50 degrees and 50% RH and 30 degrees and 30% RH for two dual optimized zones. These two options also produced a variation of 50 degrees and 40%RH as a single optimized zone. The table below shows the PI of several options studied during the project.

**Table 1. Setpoints and their relative preservation index (PI). Higher PI indicates longer preservation outlook (metric is in years).**

| Option | Set T | Set RH | PI | % PI Inc |
|---|---|---|---|---|
| Existing | 60 | 35 | 97 | NA |
| Baseline | 50 | 50 | 158 | 63% |
| 1.2a | 40 | 40 | 482 | 397% |
| 1.2b | 30 | 50 | 720 | 642% |
| 2.2a | 40 | 50 | 356 | 267% |
| 2.2b | 30 | 30 | 1356 | 1298% |

Concurrent to the PI, there were also energy metrics. Once initial ranges of temperature and relative humidity were established, the engineers could develop details for systems to achieve these different ranges. The design of the system has a high impact on the eventual energy savings. At the second all team meeting, staff and expert panelists reviewed the preliminary energy savings and offered feedback for the strategies based on both preservation and energy standpoints. The set of these preliminary energy figures are shown in the table below.

**Table 2. Preliminary energy metrics, showing different systems, operating costs, and costs from a baseline system that achieves higher preservation performance.**

| Option | Description | Investment Cost | Annual Operating Cost (Energy) | Annual Savings from Base | Simple Payback from Base |
|---|---|---|---|---|---|
| 0 | Existing system | $0 | $19,000 | NA | NA |
| Base | Existing system + minimal additions to achieve PI | $362,000 | $29,600 | NA | NA |
| 1 | Add desiccant system, 50%RH, 100% OA | $367,500 | $13,200 | $16,300 | 22.5 |
| 2 | Add desiccant system, 50%RH, mix OA | $318,500 | $12,200 | $17,600 | 18.1 |

| Option | Description | Investment Cost | Annual Operating Cost (Energy) | Annual Savings from Base | Simple Payback from Base |
|---|---|---|---|---|---|
| 3 | Add desiccant system, 40%RH, mix OA | $398,000 | $17,700 | $12,400 | 32.1 |
| 4 | Add freezer subzone, 50%RH | $150,000 | $3,000 | NA | NA |

The final results from the engineers final report included more precise implementation costs and energy figures. The table below also gives data on a baseline system, described in the earlier Accomplishments section.

**Table 3. Final energy data with refined options from engineers and team.**

| Option | Description | Investment Cost | Annual Operating Cost (Energy) | Annual Savings from Base | Simple Payback from Base |
|---|---|---|---|---|---|
| 0 | Existing system | $0 | $19,000 | NA | NA |
| Base | Existing system + minimal additions to achieve PI | $362,000 | $29,600 | NA | NA |
| 1.1x | Combined Package 1 | $530,000 | $17,700 | 11900 | 44.5 |
| 1.2a | Package 1: Add desiccant, 40%RH, mix OA for polyester and stable films | $356,000 | $12,200 | 17400 | 20.5 |
| 1.2b | Package 1: Add freezer 50% for acetates | $304,000 | $1,400 | 28200 | 10.8 |
| 1.2c | Package 1: Add gen con, OA intake reduce for all, reclaim heat | $143,000 | | | |
| 1.2d | Package 1: Staff time for desiccant packaging for acetates | | | | |
| 2.1x | Combined Package 2 | $748,000 | $16,600 | 13000 | 57.5 |
| 2.1x-b | Package 2, Phase 1 Only (no freezer) | 530000 | 17700 | 11900 | 44.5 |
| 2.2a | Package 2: Add desiccant, 50%RH, mix OA for polyester and stable other | 356000 | 12200 | 17400 | 20.5 |
| 2.2b | Package 2: Add freezer 30% for acetates | $358,000 | $1,700 | 27900 | 12.8 |
| 2.2c | Package 2: Add gen con, OA intake reduce for all, reclaim heat | 143000 | | | |

ltimately however, the engineers did not loop back to the preservation metrics. MNHS decided to sum up the balancing of both preservation and energy by creating a ratio value of preservation index / energy consumption. While the decisions had thus far been made based on both factors, it had not been clearly articulated in a quantified figure. The table below shows a summary of the ratio values.

Table 4. Final table showing PI and energy figures; last column shoes ratio of PI / $1,000 energy spent - the higher the ratio value the better.

| Option | Description | PI | % PI Inc | Investment Cost | Annual Operating Cost (Energy) | Annual Savings from Base | PI / $1,000 Energy Spent |
|---|---|---|---|---|---|---|---|
| 0 | Existing system | 97 | | $0 | $19,000 | | |
| Base | Existing system + minimal additions to achieve PI | 158 | 63% | $362,000 | $29,600 | | 5.3 |
| 1.1x | Combined Package 1 | | | $530,000 | $ 17,700 | $ 11,900 | |
| 1.2a | Package 1: Add desiccant, 40%RH, mix OA for polyester and stable films | 482 | 397% | $356,000 | $ 12,200 | $ 17,400 | 1.4 |
| 1.2b | Package 1: Add freezer 50% for acetates | 720 | 642% | $304,000 | $ 1,400 | $ 28,200 | 2.4 |
| 1.2c | Package 1: Add gen con, OA intake reduce for all, reclaim heat | | | $143,000 | | | |
| 2.1x | Combined Package 2 | | | $ 748,000 | $ 16,600 | $ 13,000 | |
| 2.1x-b | Package 2, Phase 1 Only (no freezer) | | | $ 530,000 | $ 17,700 | $ 11,900 | |
| 2.2a | Package 2: Add desiccant, 50%RH, mix OA for polyester and stable other | 356 | 267% | $ 356,000 | $ 12,200 | $ 17,400 | 1.0 |
| 2.2b | Package 2: Add freezer 30% for acetates | 1356 | 1298% | $ 358,000 | $ 1,700 | $ 27,900 | 3.8 |
| 2.2c | Package 2: Add gen con, OA intake reduce for all, reclaim heat | | | $ 143,000 | | | |

As seen in the PI / energy ratio utilized by the MNHS team, the metrics allow the team to find the right balancing point of increasing preservation index and decreasing energy use. Higher PI values are preferred, as well as lower energy costs. As such if you take PI divide over annual energy costs, the higher the value, the better the performance for both metrics. The table above shows that metric in the final column. To put the dollar amounts in scale to PI, every $1,000 is used rather than every $1. This can be adjusted depending on the scale of the institution or the time scale of the measurement.

## Next-Steps

### ***Post-Funding Plan***

There are plans to continue the grant beyond the NEH Planning Grant period. Primarily, the team hopes to receive NEH Implementation Grant to help support the construction costs. While fundraising from grants and private sources, this transition period will be an opportunity to continue communication efforts and align those with fundraising to find match funding for the Implementation Grant. The communication efforts will be primarily focused on conference proceedings and publications.

In addition to fundraising and communication, the transition period will also be an opportunity to coordinate logistics efforts for construction. During this period, MNHS staff will need to determine the end-state organization of the cold storage materials, as well as the storage period during construction. In particular, this will need to include an inventory of items in cold storage, a survey and comparison of temporary storage options, and manage the data entry in the Collections Management System. This process will continue during construction, but the key milestones will be to determine the end-state organization and develop the plan for storage during construction.

If funding for implementation is secured for 2015, the implementation phase workplan will begin fall 2015 and run through 2018 for construction. This phase will include final design and production of the construction documents, as well as additional logistics planning for the move and storage of collections from the existing cold storage rooms. The time will be primarily for procurement, construction, and final testing. Since the building will remain operational during construction, the timing and phasing of work will need to be coordinated with other users of the building and of the adjacent storage and office areas.

Finally, the implementation phase will also include the post-occupancy testing. As part of construction, a commissioning agent will help the construction remain aligned to the project performance goals. Once the project is constructed, testing will be run prior to moving collections back in. This testing will help ensure the environment meets temperature, RH, and indoor air quality goals, and help to refine the operational manual for facilities staff. Once collections are moved back into the spaces, additional monitoring and testing will be run to make sure nothing changes once materials are in the space and being accessed normally.

### ***Collaborative Partnerships***

There have been a number of collaborations that have been formed within our institutional, as well as with our expert panelists outside of our institution. During planning, Michele Pacifico, helped bring along her expertise in archival architecture, but her connections to SAA are also helpful to gain and understanding of where the rest of the archivist community stand on cold storage. Jeremy Linden helped with conservation of film materials and his role at Image Permanance Institute brought in many useful tools, such as their dpcalc.org, and the use of eClimateNotebook throughout the process of the project. Rebecca Ellis and her role as a mechanical system expert also brought in her perspective as a commissioning agent. Working with many other HVAC upgrade projects, especially in commercial or institutional buildings, Rebecca brings in the perspective of other similar, or not similar HVAC projects. Finally, Sarah Sutton (nee Brophy), represented the general museum perspective along with sustainability. Through her research and publications, she has a wide range of knowledge of other museum sustainability efforts and how our project compared to those efforts. These four expert panelists role as collaborators on the project gave us access to industry perspectives throughout the planning the process. We intend to continue working with the expert panelists during the implementation phase, and on an ad hoc basis during the transition phase.

## Long-Term Significance

### *Impacts Outside of Project*

The long term impacts will primarily be in the technical realm and affect collections managers, conservators, archivists, and facilities managers. Our project helped to define both a process and an outcome catered to upgrade the MNHS cold storage facilities; however, the process can easily be transferred to other institutions and the framework of the outcomes can be a starting point for others wishing to explore options for enhancing cold storage facilities.

The processes and tools utilized can be transferrable to other institutions for any project that involves complicated impacts on multiple departments and stakeholders. The transparency of communication and collaboration were facilitated by establishing key milestones where the entire team would be involved and defining roles for team members throughout the process. Accessible documents and notes using Google Drive was also a helpful tool to maintain communication in interim meetings and when not all team members could be involved. Other tools like dpcalc.org and eClimateNotebook that allowed the team to immediately see the impacts of decisions on our goals also helped develop consensus during all team meetings. If the team had to go back to produce the calculations, this process would have not been possible, or would have taken more meetings than would be considered effective. Further, the use of set-based design, a term borrowed from Lean efficiency processes, allowed people to have enough information about each option to make a decision. If our team had been asked what two zones should be operated at for both energy efficiency and cold storage performance at the beginning of the project, most team members would not have been comfortable with any direction. It wasn't until all the data for each of the options were presented that consensus building and decision-making could be achieved.

Further, as a long-term impact, the options explored have significance to other museums or archival facilities with cold storage. The team explored different configurations of new systems, but also discussed packaging focused approaches – instead of having the HVAC operate at low temperatures and dry humidity conditions, individual packaging of collections items with a desiccant pack can help keep dry conditions without changing the HVAC. This was considered too burdensome in terms of staff time to individually pack every item, and the impact on shelving and access were also areas of concern. In all, the study looked at several different options for mechanical system adjustments, within that several zoning (different environmental conditions) options, and packaging options. This general framework of exploration can be utilized as a starting point for other institutions to study their cold storage.

The outcome of the project could also indicate to other institutions that a two zone approach may be ideal when there are a variety of different material types to consider. In particular, the more sensitive materials such as nitrile film or acetate may require freezer zone storage, however, it is inefficient and not practical for preservation to make a single freezer zone for all materials. The costs for maintenance and energy operations is significantly higher and every effort should be made to minimize the size. In addition, for access, freezer storage requires transition spaces and time. Ideally, most materials that do not require freezer conditions are easier to access if they are kept at cool but not freezer zone ranges.

Overall, this project begins to comprehensively think about long-term preservation issues along side financial and environmental sustainability. During all team discussions, the group agreed that while it would be ideal to think that we can preserve collections in perpetuity, the reality is that the costs associated with that are just as important a factor. It is not good stewardship to built a freezer cold storage zone can only be maintained for ten years before the costs exceed an institution's ability to sustain it within their budgets. However, this project only begins to find resolutions within the balancing act of long-term preservation and energy costs. New technologies, new energy infrastructure, and other factors may still change future decisions on systems. The key outcome for MNHS and for other institutions is the process for discussing these complex issues in a comprehensive manner.

***Public Perception***

The project is not as publically oriented as program-based projects at MNHS. The primary audience has been very technical. From our expert panelists, the team has gotten the sense that the reception among technical experts will be very positive and may generate additional partnership or collaboration opportunities. The professional museum community has indicated interest in the topic via conference proceeding acceptances. Of the three conferences applied to for spring 2015, the project has been accepted to two. As compared to the typical acceptance rate for MNHS sustainability program since 2010, at 36% acceptance, it is twice as high at 66%. There is a margin of error in that there have only been 3 conferences that the project has applied to, however, as more progress is made, MNHS will continue efforts to communicate and disseminate the information to colleagues at other museums, archives, and libraries. The two conferences in spring 2015 will include the AIC in Miami, Florida, and the AAM Annual Meeting in Atlanta, Georgia.

The broader sustainability program will begin to think about how to engage the public in energy-focused projects in the future. While the cold storage energy efficiency project has gotten good reception from professional peers, it is not a public program yet. Combined with other activities and sustainability discussions for the Minnesota History Center building, there may be an opportunity to share results with a larger public audience in the future.

# Products and Follow-Up

To find out more on the project, MNHS sustainability, or for other resources go the MNHS sustainability blog – http://blogs.mnhs.org/sustainability/.

In the spring of 2015, there will be conference proceedings, available through the AAM and AIC conference systems, and also to be shared via the MNHS blog.